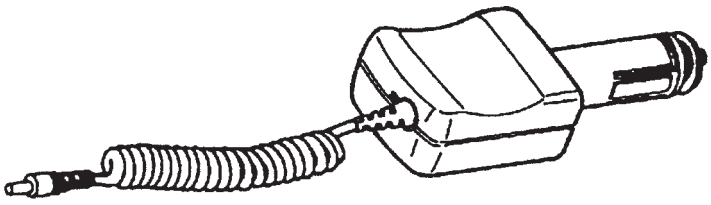
After Sales Technical Documentation

CIGARETTE LIGHTER CHARGER LCH–2



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AMENDMENT RECORD SHEET

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CIGARETTE LIGHTER CHARGER LCH–2

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Introduction

General

The LCH–2 Cigarette Lighter Charger is used for charging the battery of the phone from a 12 or 24 V cigarette lighter socket of a motor vehicle. The charger is provided with LED charging indication.

Modes of Operation

Charge States and Charge Control

The LCH–2 cigarette lighter charger is used for charging a handportable phone from a car battery. A constant–current or constant–voltage output is provided depending on the operating state of the phone.

Charge current is supplied through a series switch transistor located in the phone. When the transistor is on the charger supplies a constant current to the phone. The phone is then in the rapid charge mode.

When the transistor is off no current is supplied to the phone and the charger is in the constant–voltage mode.

Once fully charged in the rapid charge mode, the battery is kept full by means of pulsed charging. Current is switched on and off at a variable duty cycle and a frequency of a few Hz.

Charge Indication

Charger states are indicated with a dual–colour LED located in the cigarette lighter charger unit.

In addition, the phone LCD contains a three–bar battery status display, operative when power for the phone is on.

”Charging sequence active” (state A) is indicated by the bars being lit sequentially, starting from the bottom one.

”Battery full” (state B) is indicated by all three bars steadily lit.

Phone Operating Status	LED	Display
Cigarette Lighter Charger connected to vechile, phone disconnected	Green	
Phone connected to charger, charging disabled due to battery temperature	Green	state A
Rapid charge	Red	state A
Battery full –> trickle charge	Green	state B
Calling state	Green or Red *	state A

* Battery capacity is maintained during a phone call by occasional rapid charge cycles. Consequently, the LED can be indicating either red or green.

Electrical Specifications

Operating input voltage:	9 to 32 V d.c.
Input current without phone:	< 60 mA
Max. input current:	1.8 A
Output voltage:–	
• constant voltage:	12.5 ±1 V/0...400 mA
• constant current:	800 ±70 mA/5.0...10 V

Functional Description

Circuit Description

General

The charger module consists of a switched–mode converter and a bicolour indicator LED. The converter is of the step up/down type, i.e. the output voltage can be lower or higher than the input voltage.

Converter

Converter input current is received via filter capacitor C101. The converter consists of coils L110, L112, FET switch V112, d.c. level shifting capacitor C111 and Schottky diode V113. Output energy is stored and filtered by C112, L111 and C113.

In series with converter coil L112 is resistor R116, used for measuring the output current. When operating, the converter generates a negative voltage drop (as compared to ground level) at R116, directly proportional to output current.

Converter control is by N110, a quad comparator with open–collector output. The 5 V reference supply is generated by regulator N100.

Oscillator

The converter operates at a fixed frequency of 300 kHz, produced by oscillator N110A. A suitable operating voltage for the comparator positive input is set by resistor divider R112/R114. Positive feedback from the comparator output is supplied by R111 in parallel with C104. When the comparator output is high C110 is charged through R110 and R113 until the voltage at the negative input exceeds the positive input. At that instant the comparator output turns low and C110 is discharged via R113.

Pulse–width Control

Pulse width is controlled by comparator N110B, where the sawtooth voltage from the oscillator is compared to a d.c. control voltage. Max. control voltage is set by resistor divider R121/R120 to make sure that pulse width cannot reach 100 % under any conditions as this would mean short–circuiting VB to GND via V112.

When the control voltage drops, so do the pulse width and the converter output current. The control voltage can be pulled down by output current comparator N110C, output voltage comparator N110D, or by the ”error” output pin of a reference regulator N100.

Current Limiting

Output current is measured with series resistor R116 connected between L112 and GND. When the converter operates with the output loaded it generates a negative voltage drop (as compared to GND) over this resistor.

The voltage drop is added to the positive reference value set by R122 and R123 and used as the current comparator positive input. The current comparator compares the level of this input to zero (ground) level. When the current reaches the limit, voltage at the positive input falls to zero and the comparator output goes down, limiting the duty cycle. The value of the current limit is set by resistor divider R122, R123. A negative feedback for stabilizing the comparator is produced with R124.

Figure 1: Block Diagram

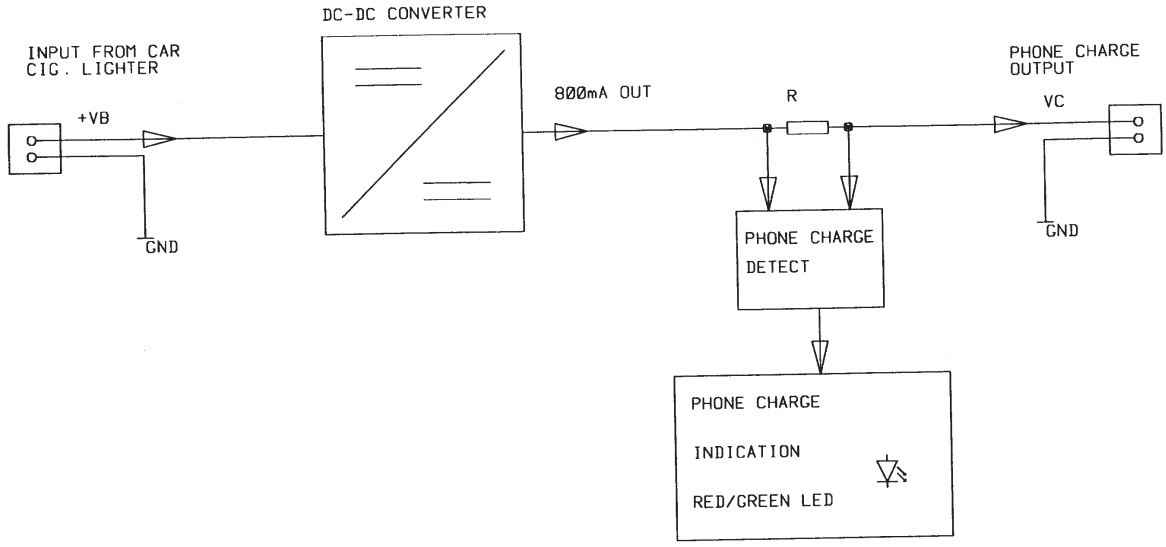


Figure 2: Component Layout Diagram

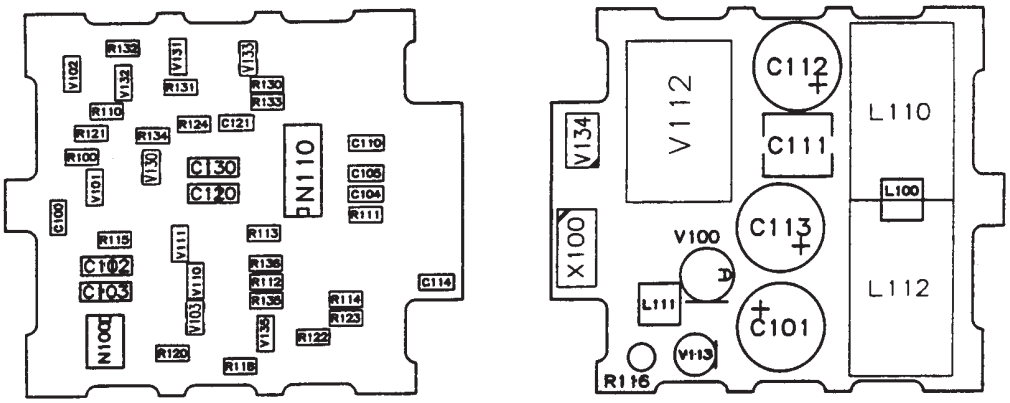
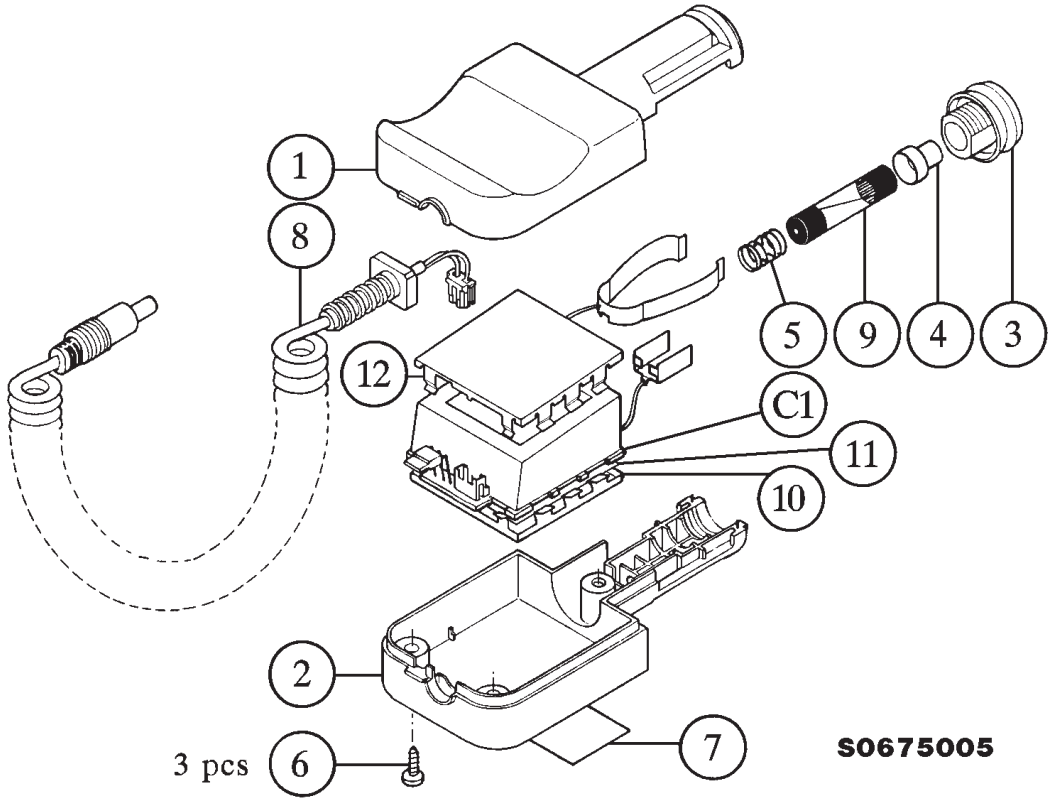


Figure 3: Exploded View



Assembly Parts

ITEM	Q'TY	CODE	DESCRIPTION	VALUE, TYPE
1		9450050	Cover	1D 21289
2		9450051	Bottom	1D 21288
3		9450052	Head–screw	3D 21287
4		9500005	Head–pin	4D 21390
5		6400056	Connector spring	4D 21391
6	3	6154430	PT–screw	25 x 8 WN–1442
7		9370095	Type label	4D 21487
8		7100408	Spiral cable	3D 21247
9		5112050	Fuse 3.15 A/250 V	6.3 x 32 mm
10		9510050	Bottom shield	4D 21395
11		9480023	Separating film	4D 21793
12			Shield	
C1		0200044	AL4 module	

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